2007

Bio-fuels, How Do You Get Turned On? The Fuel of Tomorrow, Today.

Michael Collins
Worcester Polytechnic Institute

Graham Leto
Worcester Polytechnic Institute

Evan Sawyer
Worcester Polytechnic Institute

Peter Schembri
Worcester Polytechnic Institute

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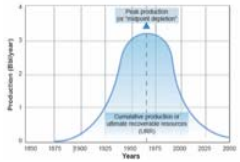
Peter Schembri, Graham Leto, Evan Sawyer, Michael Collins
Advisor: Svetlana Nikitina

Abstract

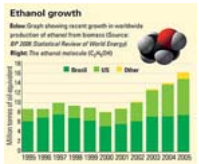
Bio-fuels are in a class of their own. Our research has shown that bio-fuels are not in competition with alternative fuel sources such as, fusion, tidal and hydrogen power, but they can pave the way for them. Bio-fuels could potentially buy us and our environment upwards of one hundred years. They are also the only fuel source which can be implemented today and dramatically reduce our greenhouse gas emissions. It is apparent that we may run out of fossil fuels within the next 50 years, and could face a major ecological disaster before then due to climate change. Bio-fuels can step in and alleviate the burden of CO2 output and give us sufficient time to develop such future technologies, as fusion. They are renewable, cost effective and clean source of energy which can ease our dependence on foreign oil. Bio-fuels, in the form of ethanol, can be generated not just from corn, but can utilize any fibrous plant material, such as rapeseed and switchgrass and other cellulostic plants. These new sources of ethanol will cut down on potential competition with food crops. Bio-diesel vehicles require minimal conversions and can replace up to 30% foreign oil imports.

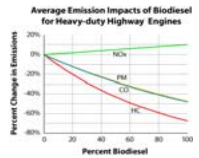


Goals

- Prove that fossil fuels are running out and bio-fuels can temporarily fill their position
- Compare bio-fuels to other alternative energy sources in terms of cost of conversion, emission reduction, and renewability
- Prove that bio-fuels are the solution to the environmental crisis at hand that is readily available.
- Demonstrate the benefits of converting to bio-diesel to WPI plant services.

Background





Fossil fuels are no longer a viable long term energy solution. We are rapidly depleting our reserves and the prices are reaching the highest on record. The estimated time that we have left running on fossil fuels is 40-50 years. Not only will prices just get higher, but with the amount of pollution there's a chance there will be no environment left for us to save.

There are several options for the replacement of fossil fuels. Several of which are hydrogen, electricity and bio-fuels. Hydrogen is considered to be the most promising candidate because it is clean, and renewable, but however its far from perfection. Electricity is also a clean solution where power is derived directly from it, but energy must still be taken from conventional power sources ad has an extremely limited range. However when these concepts come around, is everyone just going to sell their vehicles and buy into one of these new concepts? The answer is no.

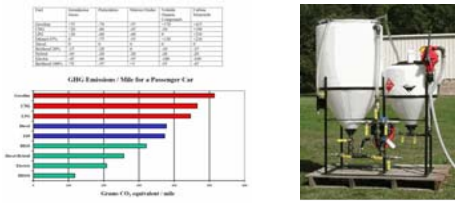
Bio-fuels are the short term answer we are looking for. Bio-diesel, a fuel derived from plants as well as waste oils, can be used in any diesel motor with little to no conversions. A simple change of rubber hoses and gaskets is the only conversion necessary. Bio-diesel also has a much better affect on the environment. It emits no lead, along with very little sulfur. There is also a 78% reduction in CO2. Within the engine bio-diesel lubricates the motor, allowing the motor to live longer than the 300,000 miles that diesels are already designed to get. Bio-diesel can even produced at home from waste oils. Home produced bio-diesel can cost as little as $0.70 per gallon.

Ethanol is produced through a much longer and sometimes more costly process. Conversions from gasoline to ethanol can also cost anywhere from $500 to $700. On average ethanol cost about $2.36 per gallon, around $0.50 cheaper than conventional gasoline. Switchgrass, a plant that used to cover the entire great plains, has been found to be a great producer of ethanol. Switchgrass produces about 1,150 gallons of ethanol per acre a year. This is about 20 times the energy output of corn.

Methodology

It became very clear to our group that many of the new technologies such as fusion and hydrogen may not be completed before we see a major negative shift in our climate and environment. We wanted to represent bio-fuels as the link between all of these upcoming technologies. We approached our paper in four main points. These points consisted of: time for conventional oil fuel to be depleted, time which implementing bio-fuel could buy the environment, comparing bio-fuels to other promising technologies, and finally, explaining bio-fuels (ethanol and bio-diesel) and their applications. We chose to investigate these four aspects of bio-fuels because we believe they show the positives and negatives of implementing bio-fuels. It seems very clear to us that in looking in detail at these topics we can push bio-fuels as the only next step in our energy future.

Our group chose to try and successfully apply a model for running bio-diesel in the five WPI diesel vehicles. We are hoping to prove that running bio-diesel will prove to be far more cost effective and will actually increase the life of the vehicles participating in the experiment. It is our hope that if we will increase awareness of bio-fuels and hopefully cause more to follow the WPI model. We believe in bio-fuels as both feasible and cost efficient, so much so that we have investigated running it in our own vehicles.



Conclusions

There is never going to be another fuel as diverse as petroleum. For centuries it has been the primary energy source. However, it is no longer a viable long term solution. It has negative effect on the environment and is becoming too expensive to be functional for much longer. Even if we don't care to alter our energy habits for the health of the planet, we're going to have to alter them soon or our quality of life will be destroyed.

Within the next 10 years we could see hydrogen fueling stations popping up around the corner. But what if it takes another 40 years longer for hydrogen power to be standard of every vehicle? We shouldn't continue to gamble with the health of the planet. If we implement bio-fuels now we could start reducing CO2 emissions tomorrow. To convert current vehicles to run on bio-fuels costs very little – for bio-diesel it costs less than $50. Bio-fuels are the stepping stone toward these future technologies that are not quite ready yet. Ethanol and bio-diesel are here today, they've just been hidden behind the thick cloud of black smoke left behind by the oil industry. Let's take the baby step, and move into a greener world. This is the future, and this can happen tomorrow.

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Future Applications

At the end of this term we are proposing our project to the WPI Plant Facilities to attempt to convert our school to operating on bio-diesel. All of the dining facilities on campus use and dispose of substantial amounts of oil every day. We are hoping to exploit this resource by converting it into Bio-diesel which would be able to be used in all of the diesel work and transportation vehicles on campus. This transition could save the school considerable amounts of money, both from not paying for petro-diesel and in not paying to have the waste oil taken away and disposed of. If successful WPI would become one of the few schools running on bio-fuels and doing more to save the environment. With WPI operating on bio-fuels, we are taking a small step towards showing the world the potential of bio-fuels and moving our country one step closer to the energy efficiency.